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### (54) METHOD AND MACHINE FOR MAKING WOUND CARTON TUBES, AND TUBES THEREFROM

VERFAHREN UND VORRICHTUNG ZUM HERSTELLEN VON GEWICKELTEN KARTONROHREN  
UND SO HERGESTELLTEN ROHREN

PROCEDE DE PRODUCTION DE TUBES EN CARTON, APPAREIL DE PRODUCTION DE TUBES  
EN CARTON PAR APPLICATION DU PROCEDE ET CORPS TUBULAIRE PRODUIT PAR  
APPLICATION DU PROCEDE

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EP 0 993 367 B1

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**Description****TECHNICAL FIELD**

[0001] The present invention relates to a method of making carton tubes as defined in claim 1.

**BACKGROUND ART**

[0002] Methods of the kind referred to above start with providing a wide sheet of carton material. This wide sheet is then divided into strips of a width that is suitable for making the tubes. The strips are coated with an adhesive and advanced towards and onto a mandrel to form carton tubes. FR-A-1,301,954 discloses a method in which blanks are first cut and then the blanks are fully coated on one side with an adhesive. After the blanks are wound onto a mandrel, the adhesive is activated.

[0003] When making carton tubes in this manner, problems frequently arise due to surplus adhesive being deposited on machine parts, such as scrapers or guides, eventually preventing the machine from operating properly, unless care is taken to remove the adhesive thus having been deposited. In practice this means that the operation must be under constant or at least frequent supervision.

**DISCLOSURE OF THE INVENTION**

[0004] It is the object of the present invention to provide a method of the kind referred to above, with which it is possible to make carton tubes or similar articles in a process not requiring constant supervision, and this object is achieved with a method of said kind, according to the present invention exhibiting the features set forth in claim 1. By proceeding in this manner, the process of applying the adhesive to the sheet material can take place, so that no adhesive in a condition, in which it can be deposited in an undesired manner on parts of the machine, will be present in the latter in any step of the method. Preferably, the wide sheet material will be provided with a coat of adhesive at some central location comprising specialized equipment for applying adhesive to the sheet material and winding the latter with the adhesive in a non-tacky state into rolls.

[0005] In a preferred embodiment the adhesive is a water-soluble adhesive.

[0006] The present invention also relates to

- a machine for making carton tubes by carrying out the method, set forth in claim 12.

**BRIEF DESCRIPTION OF THE DRAWING**

[0007] In the following detailed part of the present description, the invention will be explained in more detail with reference to the drawings, in which the principle of the method according to the invention is illustrated using

a bare minimum of diagrammatically shown components. Figure 1 shows a supply of wide sheet carton material. Figure 2 shows the strip material being advanced onto the mandrel.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

[0008] A wide sheet of carton material 10 as shown in Figure 1 has peripheral areas 11. The wide sheet carton material is coated with an adhesive that is normally not tacky but which can be made tacky by an activating step. When the adhesive is applied to coat the sheet it is normally in an active state. Therefore, the peripheral areas 11 are left uncoated. In this way, no adhesive is spilled during the coating process. The coated wide sheet carton material 10 can then be accumulated, preferably in the form of rolls 12.

[0009] The wide sheet carton material 10 is divided into sections of strip material 3 as indicated by the intersected lines in Figure 2. The sections originating from the peripheral areas are not further processed and can be recycled. The other fully coated sections 3 can be accumulated, preferably in the form of rolls 1. The fully coated sections 3 are further processed in an apparatus as shown in Figure 2. In the preferred embodiment the adhesive is water-soluble and consequently the coated strips and the finished rolls are fully recyclable. The method of making carton rolls according to the present invention is thus highly environmentally friendly.

[0010] The parts of and accessories to an apparatus according to the invention shown in Figure 2 are

- a roll 1 rotatable about
- an axis 2 so as to unwind
- a carton strip 3 passing through
- braking, guiding and/or tensioning means 4, and further through
- an activating unit 5, from which it is helically wound whilst being driven by
- friction rollers 6, in turn driven by suitable means (not shown), about
- a stationary mandrel 7,

thus forming a carton tube 8, such as of the type used to make cores in toilet rolls. It should be noted that the friction rollers 6 are merely shown to symbolize the means for rotating the tube 8 on the mandrel 7. In practice, a belt mechanism will normally be used, providing a greater area of contact with the tube.

[0011] The carton strip 3 has previously been coated with a thin layer of adhesive of the type that can be made to change from a non-tacky to a tacky state, the non-tacky state being the state within the roll 1 and along the strip 3 as far as the activating unit 5. When passing through the activating unit 5, the adhesive on the strip 3 is changed into the tacky state, in which it remains until having been incorporated in the carton tube 8. From that point, the process of removing the tube 8 from the man-

drel 7 continues in any suitable manner.

[0012] The roll 1 is manufactured in much the same manner as known tape rolls with a coat of adhesive in an inactive state, such as dry water-soluble adhesive, used e.g. for closing and sealing cardboard boxes. This means that a supply of carton strip without adhesive, e.g. a roll of carton strip as supplied by a manufacturer of such strip, is placed in a suitable unwinding stand or the like, and then pulling the far end of the strip through

- a adhesive-applying unit, in which a thin layer of adhesive of the activable type referred to above is applied to the strip, further through
- a adhesive-inactivating unit - in the case of water-soluble adhesive simply a drier capable of making the adhesive non-tacky, to end up in
- a suitable winding stand, in which the strip carrying the dried adhesive is wound to form a roll like the roll 1 shown.

Clearly, such equipment can be designed and constructed by a skilled person without the need of further guidance.

[0013] In the exemplary embodiment shown, the activating unit 5 is placed at some distance from the mandrel 7, but it may just as well be placed close to it, provided - of course - that its activating function is not compromised. Thus, if a dried, water-soluble adhesive is used on the strip 3, then it may be advantageous to have the activating unit 5 at some distance from the mandrel 7 as shown, so as to give the water being sprayed onto the strip 3 by suitable spray nozzles (not shown) in the activating unit 5 time to penetrate into the adhesive and make it tacky.

[0014] In the case of heat-activatable adhesive, the activating unit 5 - in the form of a heat source (not shown) - may be placed closer to the mandrel 7, even some distance downstream from the winding-on point 9, i.e. down and to the right along the mandrel 7.

[0015] In the exemplary embodiment shown, the strip 3 is wound helically about the mandrel 7, the latter having a circular cross section allowing it to remain stationary. The scope of the invention does, however, extend to processes differing from the one illustrated. Thus, a strip may be wound in parallel layers on top of each other, either on a round mandrel to form a short cylindrical tube, or on a rotating mandrel having, say, a square, rectangular or other polygonal cross section, so as to form the side walls in a box.

[0016] In the exemplary embodiment shown, a single strip 3 coated with adhesive on one side is used for making the tube 8. The scope of the invention does, however, extend to processes based on two or more strips, of which one or more may not have a coat of adhesive, whereas one or more may have such a coat on both sides, so that the strips are made to interleave in a suitable manner for forming e.g. a tube.

#### LIST OF PARTS

##### [0017]

5	1	roll
	2	axis
	3	carton strip
	4	braking/guiding/tensioning means
	5	activating unit
10	6	friction rollers
	7	mandrel
	8	carton tube
	9	winding-on point
	10	wide sheet carton
15	11	peripheral area
	12	roll of wide sheet

#### Claims

- 20 1. Method of making carton tubes (8) consisting of at least two layers of sheet material (3) held together by adhesive, said method being of the kind comprising the following steps:
- 25     a) providing a supply of wide sheet carton material (10),  
        b) coating said wide sheet carton material (10) with exception of its peripheral areas (11) extending in the direction of supply with a coat of adhesive that is normally not tacky but can be made tacky by an activating step,  
        c) dividing said wide sheet (10) in sections forming strips (3) of carton sheet material that are fully coated and in strips originating from said peripheral areas (11) that are not fully coated,  
        d) providing a mandrel (7) with external dimensions corresponding to the internal dimensions of the tube to be made, and  
        e) advancing a supply of said fully coated strips (3) of sheet material towards said mandrel (7),  
        f) activating the adhesive, and  
        g) further advancing said supply of fully coated strips (3) of sheet material onto said mandrel (7) so as to wind said sheet supply material on it in a manner causing said adhesive to make the layers of sheet material adhere to themselves and/or to one another so as to form a rigid tubular body.
- 30     2. Method according to claim 1 and comprising the use of braking, guiding and/or tensioning means in contact with said sheet material and guiding same towards said mandrel (7), wherein said activating step is carried out at a position between said braking, guiding and/or tensioning means and said mandrel (7).
- 35
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3. Method according to claim 1 or 2 and comprising the making of accumulations (1,12) of said wide sheet (10) or strip (3) material and subsequently using said accumulations for supplying said sheet (3,10) material being used in the method, wherein said accumulations are made by accumulating sheet (3,10) material having been provided with a coat of adhesive of said kind.
4. Method according to claim 3, comprising the step of making and using said accumulations in the form of rolls (12) of said sheet material.
5. Method according to any of the claims 1-4, in which the adhesive is water-soluble.
6. Method according to any one or any of the claims 1-5, comprising the step of using a coat of adhesive capable of being made tacky by the application of a solvent, and using such a solvent for carrying out said activating step.
7. Method according to claim 6, comprising the step of using a coat of adhesive capable of being made tacky by the application of water, and using water for carrying out said activating step.
8. Method according to claim 6 or 7, comprising the step of spraying said solvent or water, respectively, onto said coat of adhesive.
9. Method according to any one or any of the claims 1-4, comprising the step of using a coat of adhesive capable of being made tacky by the application of heat or electromagnetic radiation, and applying heat or electromagnetic radiation, respectively, for carrying out said activating step.
10. Method according to claims 1-9, wherein the strips originating from said peripheral areas (11) have a width smaller than said fully coated strips (3).
11. Method according to claims 1-10, wherein the fully coated strips (3) have a width in the range of 1/3 to 1/100 of said wide sheet material.
12. Apparatus for making carton tubes by carrying out the method according to any one or any of the claims 1-8, said machine comprising a means for supplying wide sheet material (10), a means for coating said wide sheet carton material (10) with exception of its peripheral areas (11) extending in the direction of supply, a means to divide the wide sheet (10) into sections forming strips (3) of carton sheet material that are fully coated and in strips originating from said peripheral areas (11) that are not fully coated, a mandrel (7) for winding strips of sheet material (3) so as to form a rigid tubular body (8), and comprising activating means (5) adjacent said mandrel (7) for carrying out said activating step by subjecting said sheet material (3) to a spray of solvent or water or to heat or electromagnetic radiation, respectively, according to the type of coat of adhesive having been applied to said sheet material.

#### Patentansprüche

1. Verfahren zum Herstellen von Kartonrohren (8), bestehend aus mindestens zwei Schichten Blattmaterial (3), welche durch Kleber zusammengehalten werden, welches von der Art ist, dass es die folgenden Schritte aufweist:
  - a) Vorsehen einer Zufuhr von breitem Blattkartonmaterial (10),
  - b) Beschichten des breiten Blattkartonmaterials (10) außer seiner Randgebiete (11), welche sich in Richtung der Zufuhr erstrecken, mit einer Schicht aus Kleber, die normalerweise nicht klebrig ist, die jedoch durch einen aktivierenden Schritt klebrig gemacht werden kann,
  - c) Teilen des breiten Blattes (10) in Abschnitte bildende Streifen (3) aus Kartonblattmaterial, die vollständig beschichtet sind, und in Streifen aus den Randgebieten (11), die nicht vollständig beschichtet sind,
  - d) Vorsehen eines Dorns (7) mit äußeren Abmessungen, welche den inneren Abmessungen des herzustellenden Rohres entsprechen, und
  - e) Vorwärtsbewegen eines Vorrats vollständig beschichteter Streifen (3) aus Blattmaterial auf den Dorn (7) zu,
  - f) Aktivieren des Klebers, und
  - g) weiteres Vorwärtsbewegen des Vorrats an vollständig beschichteten Streifen (3) aus Blattmaterial auf den Dorn (7), um das Blattmaterial in einer Weise darauf aufzuwickeln, dass der Kleber bewirkt, dass die Schichten an Blattmaterial an sich selbst und/oder aneinander klebend werden, um so einen starren rohrförmigen Körper zu bilden.
2. Verfahren nach Anspruch 1 und enthaltend die Verwendung von Brems-, Führ- und/oder Spannmitteln in Berührung mit dem Blattmaterial und Führen desselben auf den Dorn (7) zu, wobei der Aktivierungsschritt in einer Stelle zwischen den Brems-, Führ- und/oder Spannmitteln und dem Dorn (7) ausgeführt wird.
3. Verfahren nach Anspruch 1 oder 2 und enthaltend das Herstellen von Ansammlungen (1, 12) des breiten Blatt- (10) oder Streifenmaterials (3) und anschließendes Verwenden der Ansammlungen zum

- Zuführen des Blattmaterials (3, 10), welches bei dem Verfahren verwendet wird, wobei die Ansammlungen durch Ansammeln von Blattmaterial (3, 10) entstehen, welches mit einer Kleberschicht der beschriebenen Art versehen ist. 5
4. Verfahren nach Anspruch 3, enthaltend die Schritte des Herstellens und Verwendens der Ansammlungen in Form von Rollen (12) des Blattmaterial. 10
5. Verfahren nach einem der Ansprüche 1 - 4, bei welchem der Kleber wasserlöslich ist. 15
6. Verfahren nach einem der Ansprüche 1 - 5, enthaltend den Schritt des Verwendens einer Kleberschicht, welche in der Lage ist, durch Anwendung eines Lösungsmittels klebrig gemacht zu werden, und Anwenden eines solchen Lösungsmittels zum Ausführen des Aktivierungsschrittes. 20
7. Verfahren nach Anspruch 6, enthaltend den Schritt des Verwendens einer Kleberschicht, welche in der Lage ist, durch die Anwendung von Wasser klebrig gemacht zu werden, und das Verwenden von Wasser zum Ausführen des Aktivierungsschrittes. 25
8. Verfahren gemäß Anspruch 6 oder 7, enthaltend den Schritt des Sprühens des Lösungsmittels bzw. des Wassers auf die Klebeschicht. 30
9. Verfahren nach irgend einem oder nach irgend welchen der Ansprüche 1 - 4, enthaltend den Schritt des Verwendens einer Kleberschicht, welche in der Lage ist, durch die Anwendung von Wärme oder elektromagnetischer Strahlung klebrig gemacht zu werden, und Anwenden von Wärme bzw. elektromagnetischer Strahlung zum Ausführen des Aktivierungsschrittes. 35
10. Verfahren nach den Ansprüchen 1 - 9, bei welchem die Streifen von den Randgebieten (11) eine geringere Breite haben als die vollständig beschichteten Streifen (3). 40
11. Verfahren nach den Ansprüchen 1 - 10, bei welchem die vollständig beschichteten Streifen (3) eine Breite im Bereich von 1/3 bis 1/100 der Breite des breiten Blattmaterials aufweisen. 45
12. Gerät zum Herstellen von Kartonrohren durch Ausführen des Verfahrens nach irgend einem oder nach einem der Ansprüche 1 - 8, enthaltend eine Einrichtung zum Zuführen von breitem Blattmaterial (10), eine Einrichtung zum Beschichten des breiten Blattkartonmaterials (10) mit Ausnahme seiner Randgebiete (11), welche sich in Richtung der Zufuhr erstrecken, eine Einrichtung zum Teilen des breiten Blattes (10) in Streifen (3) aus Kartonblatt- 50
- material (10) bildende Abschnitte, welche vollständig beschichtet sind, und in Streifen, welche aus den Randgebieten (11) stammen und welche nicht vollständig beschichtet sind, einen Dorn (7) zum Aufwickeln von Streifen aus Blattmaterial, um einen starren rohrförmigen Körper (8) zu bilden, und enthaltend Aktivierungsmittel (5) benachbart des Dorns (7) zum Ausführen des Aktivierungsschritts, indem das Blattmaterial (3) jeweils einem Sprühstrahl aus Lösungsmittel oder Wasser oder Hitze oder elektromagnetischer Strahlung ausgesetzt wird, je nach Art der Kleberschicht, welche auf das Blattmaterial aufgebracht worden ist. 55

#### Revendications

1. Procédé de fabrication de tubes (8) en carton consistant en au moins deux couches d'un matériau en feuilles (3) maintenues ensemble par un adhésif, ledit procédé étant du type comprenant les étapes suivantes :
  - a) fourniture d'une alimentation en matériau de carton (10) en feuilles larges,
  - b) enduction dudit matériau de carton (10) en feuilles larges, à l'exception de ses zones périphériques (11) qui s'étendent dans le sens de l'alimentation, à l'aide d'une enduction adhésive qui est normalement non collante mais qui peut être rendue collante par une étape d'activation ;
  - c) division desdites feuilles larges (10) en sections formant des bandes (3) de matériau de carton en feuilles qui sont totalement enduites, et en bandes provenant desdites zones périphériques (11) qui ne sont pas totalement enduites,
  - d) fourniture d'un mandrin (7) dont les dimensions extérieures correspondent aux dimensions intérieures du tube à fabriquer, et
  - e) avance d'une alimentation desdites bandes totalement enduites (3) de matériau en feuilles en direction dudit mandrin (7),
  - f) activation de l'adhésif, et
  - g) nouvelle avance de ladite alimentation desdites bandes totalement enduites (3) de matériau en feuilles sur ledit mandrin (7) de manière à enruler ledit matériau en feuilles sur celui-ci de manière à faire en sorte que ledit adhésif fasse adhérer les couches de matériau en feuilles entre elles et/ou les unes avec les

- autres, de manière à former un corps tubulaire rigide.
2. Procédé selon la revendication 1 et comprenant l'utilisation de moyens de freinage, de guidage et/ou de tension en contact avec ledit matériau en feuilles et guidant celui-ci en direction dudit mandrin (7), dans lequel ladite étape d'activation est exécutée en une position située entre lesdits moyens de freinage, de guidage et/ou de tension et ledit mandrin (7).
3. Procédé selon les revendications 1 ou 2 et comprenant la fabrication d'accumulations (1, 12) dudit matériau en feuilles larges (10) ou en bandes (3) et ensuite l'utilisation desdites accumulations pour alimenter ledit matériau en feuilles (3, 10) utilisé dans le procédé, dans lequel lesdites accumulations sont fabriquées en accumulant du matériau en feuilles (3, 10) après avoir été enduites d'une enduction d'adhésif dudit type.
4. Procédé selon la revendication 3, comprenant l'étape de fabrication et d'utilisation desdites accumulations sous la forme de rouleaux (12) dudit matériau en feuilles.
5. Procédé selon l'une quelconque des revendications 1 à 4, dans lequel l'adhésif est soluble dans l'eau.
6. Procédé selon l'une quelconque des revendications 1 à 5, comprenant l'étape de l'utilisation d'une enduction d'adhésif que l'on peut rendre collante grâce à l'application d'un solvant, et de l'utilisation d'un tel solvant pour exécuter ladite étape d'activation.
7. Procédé selon la revendication 6, comprenant l'étape de l'utilisation d'une enduction d'adhésif que l'on peut rendre collante grâce à l'application d'eau, et de l'utilisation d'eau pour exécuter ladite étape d'activation.
8. Procédé selon les revendications 6 ou 7, comprenant l'étape de vaporisation dudit solvant ou de l'eau, respectivement sur ladite enduction d'adhésif.
9. Procédé selon l'une quelconque des revendications 1 à 4, comprenant l'étape de l'utilisation d'une enduction d'adhésif que l'on peut rendre collante grâce à l'application de chaleur ou de rayonnement électromagnétique, et de l'application de la chaleur ou du rayonnement électromagnétique, respectivement, pour exécuter ladite étape d'activation.
10. Procédé selon les revendications 1 à 9, dans lequel les bandes provenant desdites zones périphériques (11) ont une largeur inférieure aux dites bandes totalement enduites (3).
11. Procédé selon les revendications 1 à 10, dans lequel les bandes totalement enduites (3) ont une largeur comprise entre 1/3 et 1/100 dudit matériau en feuilles larges.
12. Appareil de fabrication de tubes en carton grâce à l'exécution du procédé selon l'une quelconque des revendications 1 à 8, ladite machine comprenant un moyen d'alimentation du matériau en feuilles larges (10), un moyen d'enduction dudit matériau en feuilles larges (10), à l'exception de ses zones périphériques (11) qui s'étendent dans le sens de l'alimentation, un moyen de division des feuilles larges (10) en sections formant des bandes (3) de matériau de carton en feuilles qui sont totalement enduites, et en bandes provenant desdites zones périphériques (11) qui ne sont pas totalement enduites, un mandrin (7) d'enroulement des bandes de matériau en feuilles (3) de façon à former un corps tubulaire rigide (8), et comprenant un moyen d'activation (5) adjacent audit mandrin (7) afin d'exécuter ladite étape d'activation en soumettant ledit matériau en feuilles (3) à une vaporisation de solvant ou d'eau ou de chaleur ou de rayonnement électromagnétique, respectivement, selon le type d'enduction d'adhésif ayant été appliquée sur ledit matériau en feuilles.

EP 0 993 367 B1

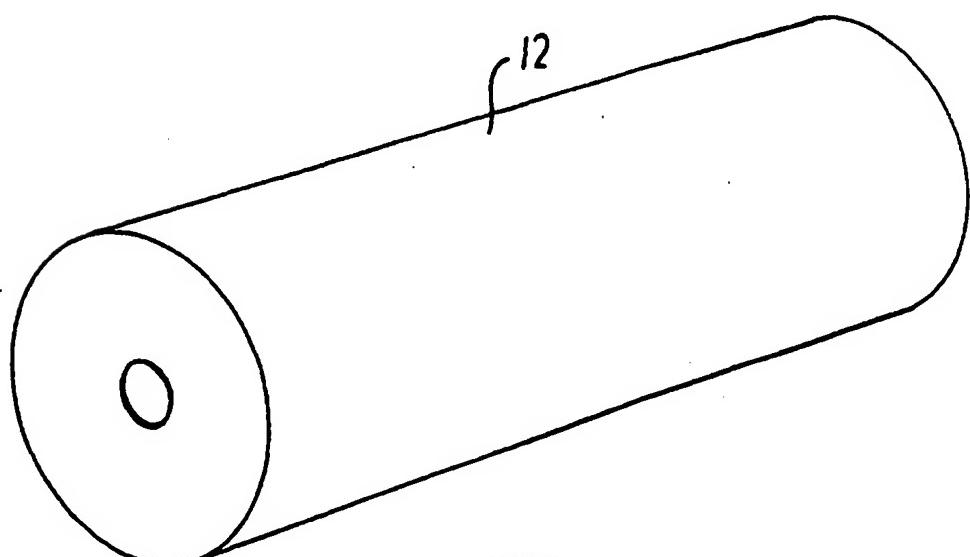
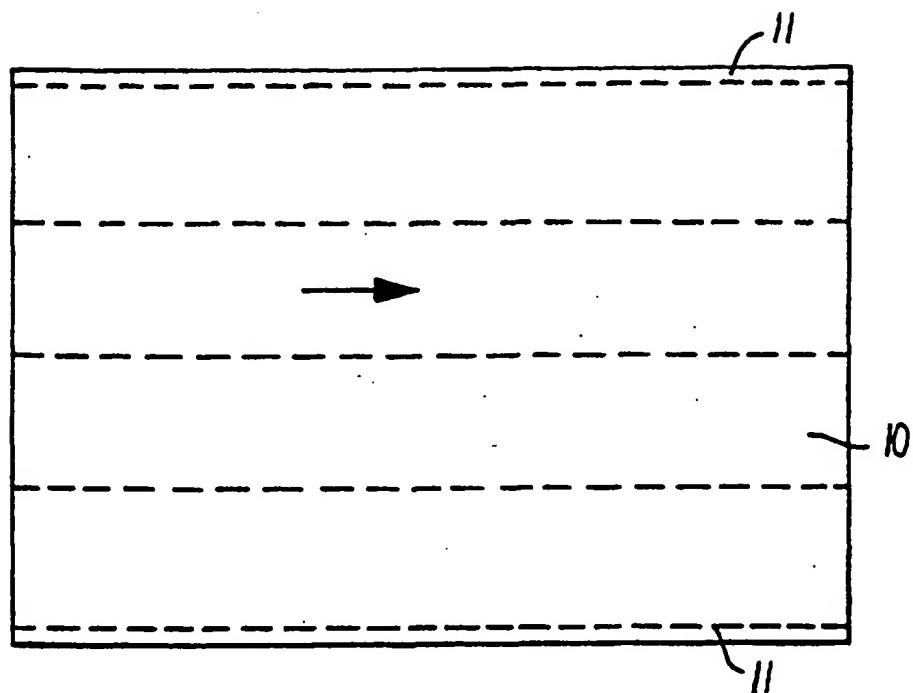


FIG. I

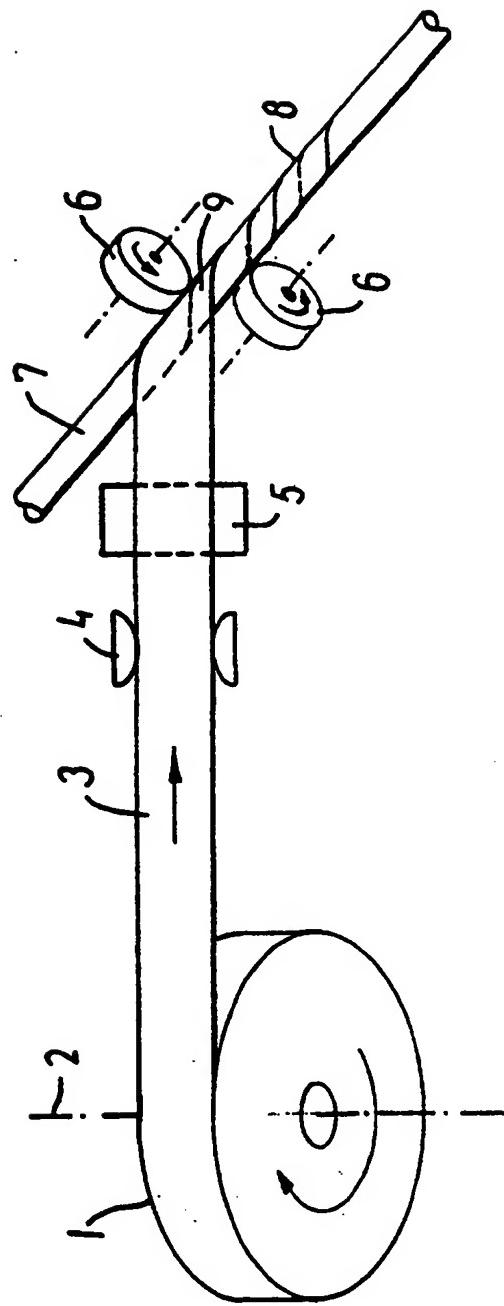


FIG. 2